

National Imaging Associates, Inc.*	
Clinical guidelines BRAIN (HEAD) MRS	Original Date: April 2007
CPT Codes: 76390, +0698T	Last Revised Date: <del>May</del> February 2021
Guideline Number: NIA_CG_003	Implementation Date: January 2023

## INDICATIONS FOR BRAIN MRS<sup>1</sup>

~~(ACR, 2019)~~

- For the evaluation of a recurrent or residual brain tumor from post-treatment changes, e.g., radiation necrosis<sup>2</sup> ~~(Chuang, 2016)~~
- For further evaluation of a brain lesion to distinguish a brain tumor from other non-tumor diagnoses (e.g., abscess or other infectious or inflammatory process)<sup>3,4</sup> ~~(Alam, 2011; Majós, 2009)~~

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## BACKGROUND<sup>3,5</sup>

~~(Alam, 2011; Hellström, 2018)~~

Magnetic resonance spectroscopy (MRS) is a noninvasive imaging technique that determines the concentration of brain metabolites, such as N-acetylaspartate, choline, creatine, and lactate, within the body tissue examined. Radiofrequency waves are translated into biochemical composition of the scanned tissue; the resulting metabolic profile is useful in identifying brain tumors, e.g., differentiating neoplastic and non-neoplastic brain lesions. In selected cases, MRS may be a valuable supplement to MRI. It is sensitive, but nonspecific. This modality should be considered as an adjunct to conventional imaging rather than replacement for histopathological evaluation.

In terms of brain tumor evaluation and classification, carefully designed multi-center trials complying with criteria of evidence-based medicine have not yet been completed ~~(Horská, 2010)~~.<sup>6</sup>

**Tumor Recurrence vs. Radiation Necrosis** – Differentiation between recurrent brain tumors and treatment related injury, e.g., radiation necrosis, is difficult using conventional MRI. The typical appearance of radiation necrosis is similar to that of recurrent brain tumors. MRS is a quantitative approach, measuring various brain metabolic markers, to help in the differentiation of recurrent tumors and radiation necrosis. This differentiation is important as additional radiation can benefit

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1—Brain (Head) MRS

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recurrent disease but can be detrimental to radiation necrosis. MRS may help in determining treatment options and in preventing unnecessary surgery. In addition, a tumor recurrence diagnosed by MRS allows the surgeon to begin treatment early instead of having to wait for symptoms of recurrence or biopsy confirmation ~~(Barajas, 2009; Chuang, 2016; Smith, 2009)~~.<sup>2,7,8</sup> However, no consensus exists regarding the value of this in clinical decision making, and no approach has yet been validated to be sufficiently accurate ~~(Chuang, 2016; Sundgren, 2009; Walker, 2014)~~.<sup>2,9,10</sup>

**Glioma** – MRS has been proposed for pre-operative grading of gliomas and differentiating high-grade gliomas (HGGs) from low-grade gliomas. It has been found to have moderate diagnostic value and should be combined with other advanced imaging techniques to improve accuracy. Currently, the data is limited; more research is needed for a definite conclusion for the utility of MRS for this indication. Therefore, it remains experimental/investigational ~~(Abrigo, 2018; Wang, 2016)~~.<sup>11,12</sup>

**MRS in other diseases** – A role for MRS has been suggested in the management of neurodegenerative disease, epilepsy, and stroke. MRS can also be applied in conjunction with MRI in the evaluation of pediatric neurodegenerative disease, traumatic brain injury and neonatal hypoxia-ischemia.<sup>13 14 15</sup> However, to better define ~~this~~ these roles, it will be necessary to standardize the MRS methodology, as well as the collection, analysis, and interpretation of data so it can be consistently translated to the applicable clinical settings. Currently, these potential applications remain experimental/investigational ~~(Oz, 2014)~~.<sup>15</sup>

## POLICY HISTORY

Date	Summary
<del>May</del> <u>February 2022</u>	<u>Updated references and background section</u>
November 2021	Added +0698T
February 2021	Updated background information and references
May 2020	Updated references
July 2019	Deleted: <ul style="list-style-type: none"> <li>• -therapeutic f/u indication</li> </ul> Added: <ul style="list-style-type: none"> <li>• -tumor versus non tumor indication</li> </ul> Updated: <ul style="list-style-type: none"> <li>• background info and refs</li> </ul>

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~~Wang Q, Zhang H, Zhang J, et al. The diagnostic performance of magnetic resonance spectroscopy in differentiating high from low-grade gliomas: A systematic review and meta-analysis. *Eur Radiol*. 2016; 26(8):2670-2684.~~

~~Reviewed / Approved by NIA Clinical Guideline Committee~~

## GENERAL INFORMATION

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

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